A COMPARISON OF THE EFFECTS ON LEARNING AND RETENTION BETWEEN INSTRUCTIONAL MATERIALS WRITTEN IN SIMPLIFIED AND CONVENTIONAL CHINESE CHARACTERS

by
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BIOGRAPHICAL NOTE

Thomas Chi-fong Ho (何志方) was born in Macao, China on 26th May, 1946. He received his Bachelor of Arts degree at Chung Chi College, The Chinese University of Hong Kong in 1970. After his graduation, he had taught in Choi Hung Estate Catholic Secondary School, Kowloon before he became Marketing Manager of A.S. Watson & Co. Ltd., Hong Kong. Since 1973, he has been working as part-time lecturer in the Adult Education Division of the Education Department, Hong Kong.

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PROBLEM

Ever since 1955 when the official use of simplified Chinese characters was nationally implemented in the People's Republic of China, the written Chinese language has been split into two different categories. The People's Republic of China (population over 700 millions) and the Republic of Singapore (Chinese population approximately two millions) are using the simplified Chinese characters (SC) while Taiwan (population approximately 15 millions) and Hong Kong and Macao (Chinese population over four millions) stick to the conventional Chinese characters (CC). Among overseas Chinese in South East Asia, U.S.A. and in other parts of the world, the attitudes towards this issue are diverse. However, more and more international publications in Chinese are being printed in simplified characters, particularly after the admission of the People's Republic of China to the United Nations in 1971.

Until very recently, the majority of the Chinese population in Hong Kong had shown little interest over the 'script reform' of the Chinese language. They seemed to be quite satisfied and complacent with the prevalent situation and were reluctant even to think of the possibility of any changes. Today, the Hong Kong Chinese community, the younger intellectuals in particular, have certainly been aroused from their trance to consider seriously

and impartially the 'Chinese script reform'. In 1972, a booklet by the title of China, U.S.A. Table Tennis 72 (Hong Kong U.S. Information Services, 1972) was printed in simplified Chinese characters - the first of this kind ever published in Hong Kong by non-communist-Chinese organizations. In July 1973, the Wen Wei Daily started as a pioneered in the use of simplified Chinese characters in Hong Kong with its headings still printed in conventional characters. On April 11, 1974, in a Radio Hong Kong Television programme called 'Needle Point', both the main speaker and the floor held a positive position to the topic "Should Chinese characters be simplified?" All these activities and many others together reflected a greater local awareness of and increasing attention to the significance of the'script reform' issue, and in particular, the 'simplification of characters' of the Chinese language.

In January, 1955, the "Draft Scheme of the Chinese Character Simplification"(漢字簡化方案草案) (Guangming Ribao, 1955) was released by the 'Committee for the Script Reform of the Chinese Language' (中國文字改革委員會) in Peking. In the introductory comments of the "Draft Scheme", the arguments for the proposed reform concentrated on the functions and need for a nation-wide knowledge and use of the simplified Chinese characters. The simplication process, in fact, was to be a transitional platform before the complete Latinization of the Chinese language.

Perhaps the best way to illustrate the proposed lan-

guage reform is to quote directly from the "Draft Scheme":

> In as early as 1940, Chairman Mao had given us instructions that the script must under certain specific conditions be reformed. In recent years, Chairman Mao has further pointed out the direction of the script reform that 'it must go in the direction of the internally known common alphabetic system.' This informs us that to reform the script, there must be a gradual procedure, and the final goal is to change to an alphabetic orthography.
>
> The script of a language, however, is something used daily by all the people. Since the non-alphabetic Chinese characters have been used for several thousand years, they certainly cannot be changed overnight and completely into an alphabetic script. It is estimated therefore that there will be a transitional stage, even after the implementation of the alphabetic script, when the old and the new system will be used simultaneously. That is to say, Chinese characters is an important tool which we must use at present and in the contracted future.
>
> Consequently, before the popular adoption and use of the alphabetic orthography, there is a pressing need that the present Chinese characters be properly simplified so as to minimize the difficulties that will occur in teaching, reading, writing and in other practical usages. (Guangming Ribao, 1955)

It is clear from the above that the script reform was to be achieved by three stages: 1) simplification of characters, 2) alphabets to help pronunciation along with characters and 3) the invention of an alphabetic orthography to replace the characters. In November 1957, the "Chinese Alphabet Draft Scheme" was promulgated. (Renmin Ribao, 1957) Its function was " ... to spell out the pronunciation of Chinese characters, so as to help the work of teaching, to standardize pronunciation and to popularize the national language ... " (Renmin Ribao, 1957) Almost

twenty years have now elapsed since the first and the second steps had been attempted, but the third and final step of an alphabetic orthography to replace the simplified characters have not in any way been proposed. This is allegedly because of certain complex difficulties yet insoluble. The simplified Chinese characters, originally a tentative device, has therefore become the communication and learning tool of the 700 million Chinese for nearly twenty years, and most probably for some years to come. The significance of the simplified Chinese characters lies on whether they do, in comparison with conventional characters, facilitate learning processes.

In 1954, Mr. Law Char Lun (羅家倫), the then vice-minister of the Examination Department of Taiwan, proposed to systematically simplify the Chinese characters in his essay "It Is a Must to Promote Simplification of Characters". (The Central Daily, 1954) This view was quite advocated by some famous Chinese scholars. However, conventional Chinese characters were retained as a communicative tool in Taiwan for the alleged reasons:

1. Simplification of characters does not necessarily facilitate learning and memorization since many Chinese characters, if unsimplified, may be easily learned and memorized by logical connections of their forms (像形), sounds (形聲) and implied meanings (指示或會意).

2. Simplified Chinese characters are deprived of the pictographic beauty and ideographic context unique to the

conventional Chinese characters. They therefore misrepresent the traditional Chinese culture.

3. Abandance of conventional Chinese characters suffocates the traditional art of caligraphy and engraving and hinders the Chinese people to study ancient Chinese books; hence they are detrimental to the traditional Chinese culture.

On the other hand, scholars in favour of simplified Chinese characters contended that:

1. Simplification of characters facilitates learning and helps memorization. They are therefore an aid to teaching and to rid illiteracy.

2. Simplification of characters saves effort and time in reading and in writing, which can be devoted to extra and more profitable work.

3. Simplified characters are more suitable for scientific and communication purposes e.g. telegrams, printing, typing, dictionary consultation, library cataloguing, etc.

4. Historically, the Chinese characters have always been going through the process of simplification, though not systematically and consistently. Simplification, therefore, does not mean the destroy of Chinese culture but rather a necessary step for cultural advance.

The diversity of opinions has already stirred up a great amount of theoretical discussions. Since 1955, newspapers and many periodicals in Mainland China have proclaimed that by adopting the simplified Chinese characters

in school teaching, the school children have been able to learn Chinese vocabulary more effeciently. Their reading speed and comprehension ability have been found faster and better than that of previous students taught in conventional Chinese characters. However, very few articles ever published have developed their arguments based on experimental evidence. With a lack of empirical knowledge concerning this issue, the controversy remains unsettled and the problem unanswered. In order to respond to this important issue, there is a pressing need to conduct a scientific research as an attempt to throw some light, however meagre, on this subject.

Problem Statement

The purpose of this study was to compare the effects on learning and retention between instructional materials written in simplified and conventional Chinese characters in regard to reproduction, pronunciation and recognition-of-meaning.

Related Literature

The Chinese characters have been going through a changing process all since its invention, majority of which have been from complexity to simplicity. Chow (1963, p.183) remarked, "Although not a simple explicity, the developmental trend of the Chinese script is from complexity to simplicity". Ei Pai Lan (1955) supported the idea of a gradual

development. Figure 1 shows the development of selected characters throughout the centuries and serves as an illustration of typical Chinese script movements. Some of the examples are from complexity to simplicity all along, others from simplicity to complexity and then back to simplicity.

In the Ming and Ching Dynasties, a number of simplified Chinese characters were prevalently used for commercial, accounting, prescription, opera-script and novel-writing purposes. Such usages were popularly accepted without, however, official recognition.

Simplification reform - initial stage (1900 - 1938). In 1900, Huang Chao (王照) first raised the problem of simplification of characters in a large scale. He invented the 'Mandarin diphthong alphabets' (官話合聲字母) which was approved by officials including Yuen Shik Kai (袁世凱). Schools for simplified characters (簡字學堂) were established for the promotion of this scheme.

In 1907, Lao Nai Suen (勞乃宣) invented a 'complete phonogram for simplifying characters' (簡字全譜). His suggestions of adopting some 116 alphabets for the Chinese language had obtained official approval from the Ching Emperor Suen Tung (宣統) for national use in June 1910. However, the practice of the proposal was interrupted by the uprise of the Hsin-Hai Year Revolution (辛亥革命) in 1911.

After the Hsin-Hai Revolution, Chien Hsuan Tung (錢玄同) in 1922 proposed his "Scheme for Reduction of Present Chinese Character Strokes" (減省現行漢字筆劃)

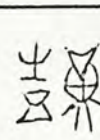
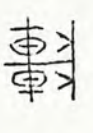
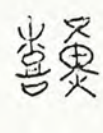
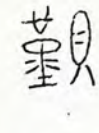
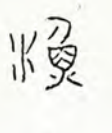
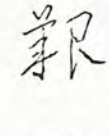
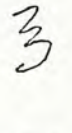
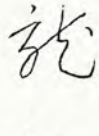
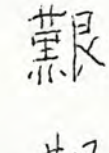
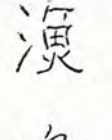
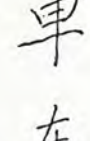
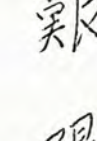
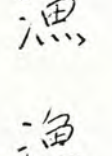
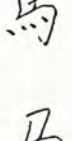
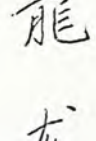
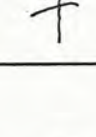
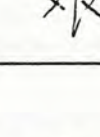
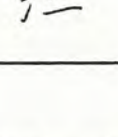
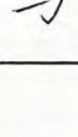
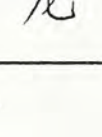
Periods	Chinese character meaning Vehicle	Hardship	Fisher	Horse	Dragon
About 1400-1200 B.C. Oracle Bone Characters (甲骨文)					
Bronzes Characters 1200-213 B.C. (金文)					
Chin Seal about 213-206 B.C. (秦篆)					
Scribe Characters about 200 B.C.-A.D. 200 (隸書)					
Running Style about 48 B.C. - present (草書)					
Standard Characters about A.D.100 - present (楷書)					
Simplified Characters about A.D.1955 -present (簡體字)					

Figure 1 - The developmental stages of selected Chinese characters.

which he suggested to be widely and officially used in educational, literary and the acadamic fields. In 1927, Chan Kwong Yao (陳光堯) in Shanghai initiated the formation of the 'Association for Chinese Script Reform' (中國文字改進學會) in his "Provisional Manifesto of the Simplified Character Movement" (簡字運動臨時宣言). He substantiated his manifesto by publishing "A list of frequently used sim-

plified characters" (常用簡字表) in 1936. In August 1935, the Education Department of the Republic of China, initiated by Chien Husan Tung, Li Chin Hsi (黎錦熙), Wong Yee (汪怡), Lin Yu-tang (林語堂) and Chao Yuen Ren (趙元任), officially announced the first set of 324 simplified Chinese characters. These simplified characters were selected on three principles:

1. The simplified characters will not be invented characters, but will be simplified characters being currently used by the public.

2. The more popular simplified characters will be made official in the first instance.

3. Traditional characters not very complicated in form will not be simplified.(Chow, F.K., 1963)

Again, the actual practice of these words and further simplifications were interrupted by the outbreak of the Sino-Japanese war in 1938, and announcement to cancel officially these characters followed not long after.

Simplification reform - experimental stage (1938 - 1954). During the chaotic period of civil and international wars from 1938 - 1949, there were still a number of scholars persisting in the study of simplified Chinese characters. Among these scholars Ei Wai (艾偉) stood as a giant. He published The Problems of Chinese Characters (漢字問題) (Ei, W., 1955), which dealt thoroughly and scientifically with practically every aspect of the Chinese characters. He was a prominently known scholar who adopted the psycho-

linguistic approach to the systematic study of the Chinese language. Among his experimental findings which he expounded in The Problems of Chinese Characters (Ei, W., 1955) and also in Educational Psychology (Ei,W., 1960), the most relevant to the present study are those related to the character form and strokes (字形及筆劃) as quoted below:

> Deriving from pychological studies on Chinese characters, particularly from the results of the perception and dictation of character forms, it appears to be more advantageous for us to promote simplified Chinese characters. The scientific findings have been analysed in detail and the eight major theorems are duplicated here:
>
> 1. Characters from one to ten strokes are easy for perception.
> 2. Some characters from 11 to 15 strokes are easy for perception and some otherwise depending on the form of each individual character.
> 3. For a character of 13 strokes or more, and composing of left and right parts (左右偏旁), the character will be difficult for perception if either part of the character exceeds the other by more than 10 strokes (e.g.劉,亂).
> 4. A character of ten or more strokes and composing of three or four parts, each of which consisted of curving or slanting strokes is difficult for perception.
> 5. If a part of a character is similar to that of another character which the learner has come across, the character may easily be mis-written and such a mental set is difficult to correct.
> 6. Characters of closed strokes (字形合攏) e.g. 田, 口, 日, 目 are easy for perception.
> 7. Characters of only vertical and horizontal strokes, e.g. 罪, 華 are easy for perception if the number of strokes of each does not exceed 15.
> 8. Characters of symmetrical strokes (筆劃兩方相稱) e.g. 罪, 開 are easy for perception. (Ei, W., 1955, p.149)

It is not meant in the present study to further investigate the truth of Ei Wai's theorems, but findings from this study would certainly bear reference to at least some

of the eight rules stated above.

Simplification reform - recent development (1955 - present). On March 2, 1955, the "Draft Scheme for the Chinese Character Simplification" (漢字簡化方案草案) was released by the 'Committee for the Script Reform of the Chinese Language' (中國文字改革委員會).(Guangming Ribao, 1955) As stated in the introduction chapter, the arguments concentrated on the functions and need for a nation-wide knowledge and use of simplified Chinese characters. Table 1 of this draft contains 798 simplified Chinese characters. Table 2 contains 400 alternative forms (異體字) of Chinese words to be cancelled and replaced by simplified Chinese characters, and Table 3 contains 54 simplified parts of Chinese characters. All these proposals have been put into official and national use since May 1, 1955.

From then on to 1965 (the eve of the Great Proletariat Cultural Revolution), an abundance of commentary and supporting articles appeared on the Renmin Ribao, Guangming Ribao, Script Reform (文字改革) which originated from the Pin-Yin (拼音) journal, and other provincial newspapers and journals, most prominently in 1966, 1967 and 1968. Publications on the subject of Chinese script reform have mostly been published in the People's Republic of China. In terms of their suggestions and implications, many of these publications (Chow Y. K., 1961; Cheung, 1957; Collection of Essays on Linguistics, Vol. 1, 1959; Documents

on Script Reform, 1957) reinforce the arguments on the "Simplification Draft Scheme", and urge the Chinese people to learn well the simplified Chinese characters.

Outside Mainland China, reactions to the simplification of Chinese characters can be found scattered in publications in Taiwan, Hong Kong and South East Asia. Many scholars held the position in favour of retaining the conventional Chinese characters, (Wong, 1967; Collected Essays on Chinese Script, Vol.1, 1955) while the second group of scholars (Mok, 1959) dwelt on the possibility of the invention of a new kind of Chinese characters (中華字) comprising of about 40 alphabets. This proposal has not been treated with appreciable responses.

"Will Chinese characters be abandoned?" (漢字會被拋棄嗎?) is an article appearing on the Hong Kong Ming Pao Monthly, 1973. The author of the article, Young Shui Han (楊瑞漢), proposed to create new phonetic-compounds (形音字) for the Chinese language. The significance of this idea needs to wait for evidence from deeper explorations.

A great deal of revisions and additions occured subsequent to the "Simplification Draft Scheme". The standardized simplified forms now used for this experiment are based on the Complete Checklist of Simplified Chinese Characters published by the 'Script Reform Publishers' in August, 1964. Very few official comments can be found on Chinese language reforms during and since the Great Proletariat Cul-

tural Revolution until 1972, when Latinization of the Chinese language was brought up once agaïn in Mainland China. Latinization, however, is beyond the scope of this study.

Hypotheses

The purpose of this study is to test the following hypotheses:

1. There is no significant difference between the achievements of Chinese children (age 6-7) in learning simplified Chinese characters and in learning equivalent conventional Chinese characters.

2. There is no significant difference between the achievements of Chinese children (age 6-7) in retaining simplified Chinese characters and in retaining equivalent conventional Chinese characters.

Definitions

'Simplified Chinese characters', 'conventional Chinese characters', 'achievements-in-learning' and 'achievements-in-retention' in this study are defined below. Others will be defined as they appear subsequently in the text.

1. Simplified Chinese characters are defined as those characters which appeared in the instructional materials in the simplified form as can be found in the Complete Checklist of Simplified Chinese Characters. (Script Reform Publisher, 1964)

2. Conventional Chinese characters are defined as those Chinese characters which appeared in the instructional materials in their conventional form as those commonly used in Hong Kong and Taiwan at the present time.

3. Achievements-in-learning is defined as the scores obtained in the achievement post-tests measuring students' ability of reproduction, pronunciation and recognition-of-meaning of the chosen simplified or conventional Chinese characters in the instructional materials.

4. Achievements-in-retention is defined as the scores obtained in the achievement retests measuring students' ability of reproduction, pronunciation and recognition-of-meaning of the chosen simplified or conventional Chinese characters in the instructional materials.

CHAPTER II

METHOD

Research Design

The experiment is based on a reverse group design. In the symbols of Campbell and Stanley (1963), the design is represented as follows:

$$\begin{array}{lll} X_1 & O_1 & O_2 \\ X_2 & O_3 & O_4 \end{array}$$

where X stands for treatments and O for tests. The post-test was given immediately after the completion of the instruction, and the retest in one-week's interval.

The main characteristic of the design is the reverse of the treatment conditions between the two groups in two separate trials. The two groups presumably comparable in most intervening variables received treatments A and B respectively, using trial I materials (appendices 1 & 2). In the second trial the treatments were reversed between the two groups; the group receiving treatment A in the first trial received treatment B in the second trial and vice versa. The instructional materials used in the two trials were completely different (appendices 3 & 4). This is well illustrated in Figure two.

Trial I	Group I (Class A)	- Treatment A	> Trial 1 materials
	Group II (Class B)	- Treatment B	
Trial II	Group I (Class A)	- Treatment B	> Trial II materials
	Group II (Class B)	- Treatment A	

Figure two - An analysis of the reverse group design.

The pooling of the data obtained from the two trials of the experiment on the basis of the treatment conditions helps to ensure the effect of group equivalence. The difference in learning capacity between class A and B, if any, would be matched by the arrangement of the classes learning half of the simplified and half of the conventional characters.

The dependent variable in this experiment is achievements in learning and in retention of the 50 target characters while the independent variables are the two types of Chinese characters. All intervening variables such as intelligence, language aptitude, study habit etc., were believed as being equated by the reverse group design and the random assignment of the students to class A and B.

Sampling

Subjects were drawn from the Primary one classes of the A.M. Section of Hong Kong Salesian Primary School, an Anglo-Chinese boys school considered to be of average standard in Hong Kong. The boys aged from 6 to 7 years old. Most of them came from middle-class families. They were originally placed in classes A, B and C by random. Two classes, A and B and each with 50 students were selected from these three classes because classes A and B were both taught by the same Chinese teacher who was going to teach the Trial I material in this experiment. The previous knowledge in Chinese language of the two sampled classes could, therefore, be assumed to be similar.

In considering the population of the sample pupils, the following characteristics could be discovered:

1. They had learned only a very limited number of either conventional or simplified Chinese characters.

2. They were unaware of the political implications of the two types of the Chinese characters, and would be fair towards either type.

3. They were ready to learn 50 Chinese characters in about one week's time because they were at the age where their cognitive abilities would enable them to learn new concepts and words.

Instrument

Instructional materials. The instructional materials (appendices 1, 2, 3 & 4) were developed on the basis of the story adapted from a popular Chinese novel Adventures to the West (西遊記) by Wu Shing En. (1961) In order to appeal to the interest of children of this age, the materials was drawn from a section of the chapter called The vampire thrice rediculed Tang San Chuong; the sacred friar angrily expelled the cunning monkey supreme. (屍魔三戲唐三藏,聖僧恨逐美猴王). The original title of the story, Adventures to the West, was used for the instructional materials because of its popularity. This story is of a fictitious type, involving witchcraft, evil spectres and animal phantoms, and Chinese Kung Fu in fighting scenes. The four main characters in the story, Tang San Chuong (唐三藏), Suen Wu Kung (孫悟空), Chu Ba Kai (豬八戒) and Sha Hwor Sound (沙和尚) are so popular among the Chinese folks that majority of the students must have heard about them through their parents or in the movies and T.V. programmes. The teachers would need very little effort to capture the students interest and to explain the background of the story, and could put their emphasis on the target characters almost right from the start.

The adapted story was of 277 characters in length and among them 50 characters were with simplified and conventional versions to be tested. The ratio of the tested

characters to non-tested characters was less than 1 to 5. All other characters which acted as auxiliary characters in the compilation of the story frame had no simplified forms.

The story had been devided into two parts, part I of 141 characters and part II of 136 characters, with each part taking 25 target characters. To promote even keener interest from the students, the part I and part II materials were each inserted with a related picture as illustration. This was also an effort to make the instructional materials as similar as possible in length and in format to the normal Chinese lessons for Primary one classes.

The 50 target characters were selected upon the following criteria:

1. They were slightly above Primary 1 standard, so that selected students should not have come across them. This had been ascertained by going through all the Chinese textbooks for use in Primary one classes of the target school. It is noted that none of the 50 target characters was found in the aforementioned textbooks.

In addition, the Suggested Syllabuses for Primary Schools - Chinese (小學中國語文科課程建議) issued by the Education Department of Hong Kong in 1970 had been consulted. None of the 50 target characters was included in appendix II of the syllabus, which is a list of 500 Chinese characters as a suggested guide to Chinese vocubulary for primary one (小學一年級字彙).

2. They were not over-difficult for Primary one students. This again had been verified by matching the 50 chosen characters with appendix II of Suggested Syllabuses for Primary School - Chinese, which is a list of Chinese characters as a suggested guide to Chinese vocubulary for Primary schools (小學中文字彙).

The Chinese teacher of class A and class B in Primary one of Salesian School was asked to check on the 50 target characters and the whole text of the instructional materials. After certain revisions according to her suggestions, she agreed that to the best of her knowledge the 50 target characters should not have been met by either class A and B students, and no characters in the entire text appeared to be over-difficult for the target students.

Those Chinese characters which acted as auxiliary characters in the compilation of the instructional materials have no simplified forms, and were kept as simple and different as possible from the target characters so that no reinforcing or interfering effect would be derived. In fact, all the auxiliary characters can be found in the appendix II of the Suggested Syllabuses for Primary School - Chinese.

During the development of the instructional materials, much attention had been given to the general rules for the simplification of Chinese characters. Such rules had not been explicitly explained by the authorities in

Mainland China. However, they were deducted and analysed in quite a number of occasions. Ten general rules to construct simplified characters(Appendix 5) were brought up in No. 56 of Mainland China Studies Bimonthly, (Wong, 1973) As stated, these ten rules are comprehensive though not exhaustive in nature.

There were two characters among the 50 target characters, 無 (无) and 萬 (万), which do not fall into the ten categories. They originated from the ancient Chinese characters which have been the source of quite a number of the simplified Chinese characters, but which have not literally gone through any process of the annotated simplications.

It was unnecessary and technically impossible to maintain an equal distribution of the 50 target characters under the ten rules since the number of simplified Chinese characters do not fall at equal proportions into these ten rules. To break down the 50 target characters under these ten headings (appendix 5) would, however, provide a clearer picture of how and under what conditions Chinese characters were simplified, and might be a useful help to the understanding of the simplification of Chinese characters, and subsequently the understanding of the research outcome of the present study.

Testing devices. The rationale of testing on the three aspects, namely reproduction, pronunciation and recognition-of-meaning of the Chinese characters was based

on Ei Wai's analysis of 'the criteria of knowing a character'.(Ei,W.,1955,p.5)He maintained that "a Chinese character can be devided into three segments: the form, the pronunciation and the meaning. What we called knowing a character means knowing the pronunciation and meaning when seeing the form, and knowing the meaning and form when listening to the pronunciation. These relationship can be shown in the following diagram ..." (Ei,W.,1955,p.5)His diagram is reproduced in figure three.

He continued to say that " ... the responses to these four connections: form-to-pronunciation, form-to-meaning, pronunciation-to-form and pronunciation-to-meaning must be correct, and their relations well grasped before a character can be considered known. If there is one mistake (in these four responses), the character cannot be considered completely known." (Ei, W., 1955, p.5)

As the present experiment concentrated on the study of the simplification of character forms, the tests had been measures of pronunciation-to-form relation as in reproduction tests, form-to-pronunciation relation as in pronunciation tests and form-to-meaning relation as in recognition-of-meaning tests.

The reproduction, pronunciation and recognition-of-meaning test procedures in the post-tests and retests will be detailed in the next section. It is just relevant to note here that judging of right or wrong answers given by the students in oral explanations in the recognition-of-

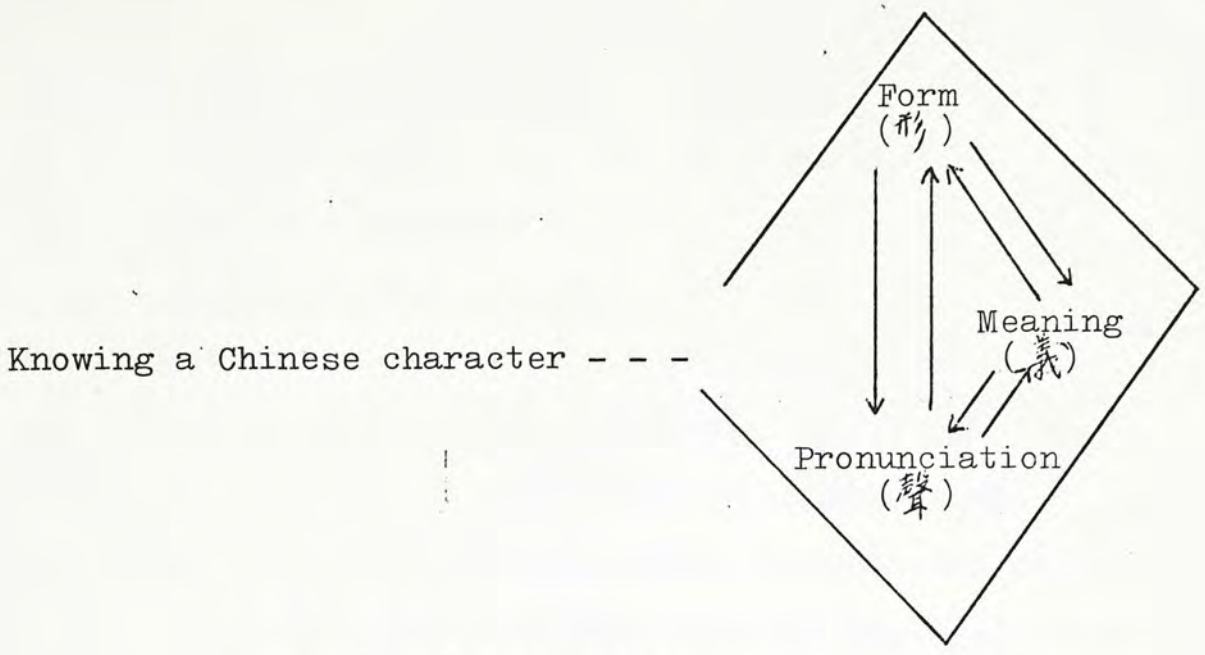


Figure 3 - The relationship of the three language aspects.

meaning tests was entrusted to the examiners as all three examiners had been trained to do the job.

Procedures

The experiment began on the fourth of February, 1974. The Chinese teacher of class A and B of Primary one of Salesian School was responsible for the trial I of the experiment, while an experienced teacher not teaching at the Salesian School took part in the second trial. The two teachers were also each responsible for the post-tests after their own instructions. All retests were conducted by a third tester. The author was responsible for briefing the three teachers on the proper procedures of teaching and testing. The purpose of employing two teachers instead of

one was to lessen the probability of the teacher being biased, consciously or unconsciously, to either simplified or conventional characters, and thus causing incorrect results of the experiment.

Instructional procedures. In trial I, the instructional materials for both classes were the same except that class A instructional materials were consisted of 25 simplified characters while class B instructional materials were consisted of 25 corresponding conventional characters. The teaching method was similar to that employed during regular Chinese lessons. Both classes were taught for two periods (35 minutes each) per day for the first two days of the experiment. The post-test was given to both classes on the third day.

The same procedures applied to the second trial. The second teacher using the Part II materials carried out trial II with the groups being reversed in terms of treatment conditions. The actual processes for the two trials were outlined in figure four.

No homework was given to either class A or B throughout the experiment by either teacher. All practices were done in class and were similar for both classes. All instructional materials were collected at the end of each day. The students were not informed that they were learning simplified or conventional characters; they were simply briefed that a story drawn from the Adventures to the West would be the subject for Chinese lessons to replace regular

Date Class	Feb 4 Mon. Feb 5 Tues.	Feb 6 Wed.	Feb 7 Thurs. Feb 8 Fri.	Feb 9 Sat.	Feb 11 Mon.	Feb 14 Thurs.
Class A	Part I SC Instructions	Post-test	Part II CC Instructions	Post-test	Re-test	Re-test
Class B	Part I CC Instructions	Post-test	Part II SC Instructions	Post-test	Re-test	Re-test

Figure 4 - Actual procedures of the teaching and testing details.

Chinese lessons for one week. The amount of class practices was equivalent in the two classes for both trials.

Testing procedures. The reproduction tests were conducted in class on dictation sheets supplied by the examiners. In each reproduction test, the examiner read out to the class twice each of the 25 target characters, and about 30 seconds were given for the reproduction of each character. Each test took about 30 minutes.

In the pronunciation and recognition-of-meaning tests, the students were summoned one by one to the teacher's desk to read out and to explain orally the 25 characters which were clearly shown on a prepared sheet of paper. The teacher was responsible to mark down the results on a prepared score sheet. Each pronunciation and recognition-of-meaning test for one class took about $2\frac{1}{2}$ hours.

The two retests were carried out one week after the Part I and Part II instructions respectively, that is, on the 8th and the 11th day from the beginning of the experiment.

The retests were conducted by a third teacher in the same way as the two post-tests.

Data Analysis

As indicated in the section on the research design, in order to equate possible class differences, the scores of the 50 simplified and 50 conventional characters were obtained by pooling the data from the trials of the experiment on the basis of the treatment condition. In more details, experimental data as shown in diagram five had been obtained from the post-tests and the retests: (appendices 6, 7, 8, 9, 10 & 11)

Uncorrelated 2-tailed t tests were employed to detect the significance of difference between scores on simplified and conventional characters in reproduction, pronunciation and recognition-of-meaning tests. The criterion to decide the significant difference was set at .01 level of confidence, both in the post-test and the retest.

Correlated 2-tailed t tests were employed to detect the significance of difference in scores on each of reproduction, pronunciation and recognition-of-meaning tests between the post-test and the retest, both for the 50 simplified and the 50 conventional characters.

The inter-correlation coefficients among scores in reproduction, pronunciation and recognition-of-meaning of both the simplified and the 50 conventional characters in the post-tests as well as in the retests were computed to

Scores Characters	Post-test	Retest
50 simplified characters	Reproduction Pronunciation Recognition	Reproduction Pronunciation Recognition
50 conventional characters	Reproduction Pronunciation Recognition	Reproduction Pronunciation Recognition

Figure 5 - Achievement scores obtained in learning and retention post-tests and retests of the target characters.

determine the relation of the three language aspects.

CHAPTER III

RESULTS AND DISCUSSION

To determine the different effects the two types of Chinese characters exerted upon the students' learning and retention levels, three major comparisons by *t* tests were made on scores of reporduction, pronunciation and recognition-of-meaning respectively in both post-test and retest programmes. The two sets of scores obtained from trial I and trial II were pooled on the basis of treatment conditions in accordance with the reverse group design to balance the possible group differences. Of the original sample of 50 students in both classes, only 48 students completed both the post-test and the retest in each case, thus the number of valid scores is 48 for each class.

Reproduction Scores

Tables 1 and 2 present the pooled mean and *SD* of the scores of the two trials in the reproduction post-test and retest. The results of the pooled *t* analysis between the two treatment groups are also given.

The null hypotheses set for both cases are rejected as both the *t* values yield significant difference in mean scores between the two treatment groups. The students receiving instructions in simplified and conventional characters did differ in performance in reproducing the 50 corresponding characters. As expected, the

Table 1

Comparison of Means of Post-test Scores on Reproduction and the *t* test Analysis

Treatment Group	Pooled Mean Trials I & II	N	Pooled SD	t
CC	21.22	50	10.61	2.79*
SC	27.36	50	11.14	

Table 2

Comparison of Means of Retest Scores on Reproduction and the *t* test Analysis

Treatment Group	Pooled Mean Trials I & II	N	Pooled SD	t
CC	18.30	50	9.95	2.646*
SC	23.40	50	8.85	

* $p < .01$

simplified character (SC) groups achieved better results than the conventional character (CC) groups in the reproduction tests given immediately after the completion of the instruction and in one-week's interval.

The retention rate is also an important variable to be investigated. The problem whether the simplified characters would bring more persistent learning and better retention of the target characters is crucial to teaching and learning processes. Table 3 offers the contrastive scores of post-testing and retesting programmes together with their correlated t values and the retention rates.

The percentages of characters retained in reproduction in one-week's interval are 86.24% and 85.53% for the CC and SC treatment groups respectively. However, in both cases the t values on mean scores between the post-test and the retest are not significant. The two types of Chinese characters did not affect the memory factor (one week's duration) in reproducing the characters. The expectation that either type of characters would exceed the other in the retention rate was proved to be groundless.

Based on the reproduction tests, the results of the present study support the assumption that the simplified forms of Chinese characters enhance acquisition and retention levels in reproduction performance, though not necessarily the retention rates. These findings are compatible with previous observations by Choi Lor Shing (蔡樂生) (Ei, W., 1955) in which characters of various

Table 3

Retention Rate of Conventional and Simplified Characters in Reproduction

Treatment Group	Pooled Scores Trials I & II	Maximum Scores	t	Retention %
Post-test CC	1061	2400		
			0.98	86.24
Retest CC	915	2400		
Post-test SC	1368	2400		
			1.21	85.53
Retest SC	1170	2400		

numbers of strokes were compared. The results of this experiment suggest that within the framework that the reduction of strokes helps reproduction, reduction may not be the only factor that influences the difficulty level of reproduction. This finding had been organized into part of the eight rules generalized by Ei Wai (1955), which had been mentioned elsewhere in Chapter I.

In addition to the overall results, in-depth analysis of the individual items of the reproduction tests was conducted in search of underlying factors for theoretical clarifications. Inconsistent with the general pattern of the total score analysis, nine conventional characters were found attracting more correct answers than the corresponding simplified characters both in the post-test and in the retest (appendix 6 & 7). They are觀(观), 勸(劝), 蠅(蝇), 閉(闭), 獨(独), 邏(逻), 邊(边), 傘(伞), 劃(划).

One of the possible reasons for this phenomenon is that students had learnt similar parts of the conventional characters so that they were more familiar with the conventional forms. For example, once they had learnt 畫, 繩, 羅 or 門, it would be much easier for them to reproduce the conventional version 劃, 蠅, 邏 and 閉 than the simplified versions even though the latter ones have considerably fewer strokes. This disclosure seems to make the interpretation much more complicated. Nevertheless, there is some ground to state that besides character forms, other

factors such as the association of similar parts of a character might have to be brought in to account for the learning outcomes. This argument tends to reinforce the positive results for the simplified characters as demonstrated in the total score analysis. For even though the factor of familiarity with parts of Chinese characters might have raised the scores in reproducing some conventional characters, this raise had been over-ridden by the advantages of the character simplification.

There is another general phenomenon which could be employed to explain the present outcomes. This phenomenon seems to be very close to the Gestalt theory on perception, which holds that the perception of a unit does not depend on the sum total of the addible parts but on the dynamic relationship of the unit such as the completeness, the symmetry and the part-whole relation. For example, the simplified version 广 and 逻 recorded lower scores than those of their conventional counterparts 嚴 and 邏 both in the post-test and retest. The lack of a completeness of unit in the simplified version of the two characters might well be a factor to influence adversely the perception ability of the students. The same adverse effect, exerted by the lack of symmetry or part-whole relation, may account for the lower scores of the simplified version of characters like 闭(閉), 观(觀) and 逻(邏). It is not evident to conclude, therefore, that the more strokes it is reduced, the easier it is to reproduce the character or to retain it.

The correlation coefficient of the stroke reduction and the reproduction scores of simplified over conventional characters is -0.062 in the post-test and -0.201 in the retest. The resultant coefficients are surprisingly negative, though not significantly different from zero. The relationship between the character form and the learning variable is not so direct as it seems.

Simplicity in character form in general facilitate the ability to reproduce and retain the characters; yet to generalize interpretations on this facilitative effect needs to introduce a cluster of relevant variables. Students could hardly reproduce all the characters with the same number of strokes, even those within their ability of mastery. On the other hand, dispitethe character complexity, characters of varying numbers of strokes would appear to students of the same level of difficulty. The fact that the difficulty level of characters varies dispite the same number of strokes had been demonstrated in Choi's studies (Ei, W. , 1955). The present finding appears to substantiate this fact. It is believed by investigators (Ei, W. , 1955) that the difficulty levels of characters rely not only on character complexity but also on the cognitive development of the children. Children at a given age level may generally reach a certain limit of the character difficulty in terms of number of strokes, but may perceive no apparent difference among characters with varying number of strokes within the difficulty limit. A six-

year-old child, for example, may learn to reproduce characters up to 15 strokes as his limit, but may find no variation in difficulty when reproducing characters from 11 to 15 strokes. Unfortunately, this belief remains a speculation and awaits empirical confirmation.

Pronunciation Scores

The pooled mean and SD of the scores of the two trials in the pronunciation post-test and retest, together with the results of the pooled t analysis between the two treatment conditions are presented in Tables 4 and 5.

The t values between the scores of the two treatment conditions derived from the pronunciation tests are not significant, both for the post-test and retest, indicating that the pronunciation achievements between the CC and SC groups were comparable. The null-hypotheses assuming no group difference in pronunciation performance are therefore not rejected. The influence of form upon sound in Chinese characters was not borne out as predicted.

The retention rate of conventional and simplified characters are 83.88% and 85.20% respectively. Table 6 offers the contrastive results of post-testing and retesting programmes together with the correlated t values and the retention rates.

The percentages of correct pronunciation for one-week's retention were high and over 80% for both treatment groups. The comparison between post-test and retest scores

Table 4

Comparison of Means of Post-test Scores on Pronunciation and the *t* test Analysis

Treatment Group	Pooled Mean Trials I & II	N	Pooled SD	t
CC	37.10	50	7.99	0.80
SC	35.80	50	8.29	

Table 5

Comparison of Means of Retest Scores on Pronunciation and the *t* test Analysis

Treatment Group	Pooled Mean Trials I & II	N	Pooled SD	t
CC	31.12	50	9.23	0.34
SC	30.50	50	8.78	

Table 6

Retention Rate of Conventional and Simplified Characters in Pronunciation

Treatment Group	Pooled Scores Trials I & II	Maximum Scores	t	Retention %
Post-test CC	1855	2400		
			1.01	83.88
Retest CC	1556	2400		
Post-test SC	1790	2400		
			1.03	85.20
Retest SC	1525	2400		

yielded non-significant t values, implying that the decrease in pronunciation ability due to the memory factor was not significant in one-week's interval. The two types of Chinese characters led to similar level of decrement in pronunciation scores.

The results concerning the form-to-pronunciation relationship concur with that of the study by Choi Lor Sheng (Ei, W., 1955). The ability in pronouncing Chinese characters did not vary significantly with the form complexity. The reduction of strokes in Chinese characters did not enhance the form-to-pronunciation association. An inspection of the item scores reveals no consistent response patterns. The high-score items scattered between the two types of characters, and each type shared almost equally the high-score and low-score items. As the selection of items or characters in this study was not particularly geared to investigate the relationship between the sound and the structural aspects of characters such as phonetic compound, phonetic loan, picto-graphic, etc, there was hardly sufficient justification to support the interpretation from the stand-point of character structure.

It seems to be taken for granted that the Chinese people are customary to pronounce characters according to one part of the character (有邊讀邊). For in most phonetic-compounds, a part tends to determine the pronunciation of the character. This phenomenon, however, was found inconsistent based on the results of the present

study. For example, conventional and simplified characters such as 衛,霧,劃,爺,守,让 and 扑, though falling into the above category, did not enhance the pronunciation achievement of the students. Nevertheless,other characters of the same nature,吓,达,圍,邏,蒼 and 傷, helped to better their performance. Within this perspective, the simplification rule "by changing to or creating a new phonetic-compound" (appendix 5), which was used most frequently in character simplications, had not been found to be advantageous for improving the pronunciation achievements. In fact, both conventional and simplified characters created on the basis of the phonetic-compound principle might not 'trigger' the students to read the characters by their parts.

Tracing back further to the ten simplification rules as summarized by Wong Shia Wan (appendix 5), the rule "By preserving the upper and lower parts of the character and omitting the middle part" seems beneficial to the acquisition of character pronunciation. In the present experiment, all three characters simplified according to this rule,虑, 寻 and 夺, gained higher scores than their conventional counterparts in both the post-test and the retest. It seems that this technique of simplification did play a part in the facilitation of character pronunciation.

Concerning the reduction of strokes in this experiment, the simplification processes had reduced over 50% of the number of strokes of the conventional characters. (appendices 12&13) Yet the correlation coefficients of the

reduction of strokes and the pronunciation test scores of simplified over conventional characters are low and negative, approximately -0.24 and -0.28 for the post-test and retest respectively.

Thus in general, the experimental data did not support the assumption that simplified forms were more advantageous to the perceptual level and would strengthen the form-to-pronunciation association. The psychological process to connect the form-sound association was not signified by the simplicity in forms alone. It is possible that the phonetic elements of some characters did play a role in decoding the perceptual form by its label. But to pinpoint the structural and phonetic rules which would facilitate the perceptual process in labelling the characters is beyond the scope of this study. In the present experiment, the tendency is that the simplification of characters neither helped nor prevented the form-to-pronunciation learning and retention of the Chinese characters.

Recognition-of-Meaning Scores

The means and SD obtained from the recognition test are presented in Tables 7 and 8 together with the pooled t analysis between the two treatment conditions. The results fail to reject the null-hypotheses that there is no significant difference on the recognition-of-meaning scores between the SC and CC groups. The anticipation that difference of complexity in character-form would produce different clues

Table 7

Comparison of Means of Post-test Scores on Recognition-of-Meaning and the *t* test Analysis

Treatment Group	Pooled Mean Trials I & II	*N*	Pooled *SD*	*t*
CC	40.32	50	6.04	1.43
SC	38.46	50	6.85	

Table 8

Comparison of Means of Retest Scores on Recognition-of-Meaning and the *t* test Analysis

Treatment Group	Pooled Mean Trials I & II	*N*	Pooled *SD*	*t*
CC	37.04	50	6.90	1.50
SC	35.24	50	4.79	

for the form-meaning association is not confirmed by the present data.

The retention rate of conventional and simplified characters are 91.87 and 91.63 respectively. Table 9 offers the contrastive results of post-testing and retesting programmes together with the correlated *t* values and the retention rates. The obtained data reveal that the retention rate on the recognition-of-meaning score is over 90% for both conventional and simplified characters groups. The loss suffered by the lapse of one-week's time in recognition-of-meaning scores was found non-significant as evidenced by the correlated *t* values. Nor was the decrement in scores found significantly different between the two treatment groups.

Regardless of the treatment effects, there is a tendency that the students, on the average, memorized the character-meaning better than the character-form and character-sound aspects of the Chinese characters. The difference in grasping character-meaning and character-sound is synonymous to that between connotative and denotative learning. According to Jensen's theorization (Jensen, 1963), the cognitive process required by the former learning is more complicated and sophisticated than the latter one, and hence lengthens the learning effect; the qualitative variation existing in the acquisition process in the two types of learning would undoubtedly affect the retention level. Therefore, the varying retention rates

Table 9

Retention Rate of Conventional and Simplified Characters in Recognition-of-Meaning

Treatment Group	Pooled Scores Trials I & II	Maximum Scores	t	Retention %
Post-test CC	2016	2400		
			1.05	91.87
Retest CC	1852	2400		
Post-test SC	1923	2400		
			1.04	91.36
Retest SC	1762	2400		

among the three Chinese language aspects are interpretable with reference to the cognitive analysis of verbal behaviour by Jensen (1963).

The acquisition of character-meaning depended on other elements such as character-shape or character-structure besides the character complexity. The direct form-to-meaning relationship seemed to be more imaginative than real. The conceptual function in grasping the character-meaning relation was not promoted significantly by the simplified form of the characters. Suffice it is to point out that the mean scores in recognition tests between the two types of characters are not significantly different both in the post-test and retest in spite of the character simplification.

There is a lack of relationship between the number of strokes reduced and the gain of recognition-of-meaning scores. The correlation coefficients concerning the reduction of strokes and the recognition-of-meaning scores of simplified over conventional characters were non-significant, though negative (-0.02 and -0.053) for the two tests. To sum up, the result of this experiment suggests that the simplification of character neither helped nor prevented the form-to-meaning assodiation in learning and retaining the Chinese characters.

The Relationship of Form-Pronunciation-Meaning

As this experiment is basically a study of the form-

to-pronunciation, form-to-meaning and pronunciation-to-form relation of the simplified versus conventional Chinese characters, the correlation between the scores on these three aspects will be of interest to investigators conducting analytical studies of the Chinese characters. Tables 10, 11, 12 and 13 are the inter-correlation coefficients for the post-test and the retest results.

The pronunciation-meaning correlation coefficient was high for both the conventional and simplified characters, ranging from 0.657 to 0.895. This implies that reading the characters or recognizing them by meaning required certain common elements in conceptual functioning. A student who knew how to read the character knew its meaning too, or vice versa. The reproduction-pronunciation and reproduction-meaning correlation coefficients were quite high except those for the conventional characters obtained in the post-test. In general, the coefficients based on the retest scores were slightly higher than those on the post-test. The familiarity with the test content and format in retests might be the chief factor responsible for the higher coefficients. The coefficient on meaning-pronunciation correlation was consistently higher than those on reproduction-meaning and reproduction-pronunciation correlations. This should raise no surprise as in pronunciation and recognition-of-meaning, students were required to decode the characters by sound or meaning on the basis of the visual forms, whereas in the reproduction tests, they were asked to reproduce the

Table 10

Intercorrelation Coefficients Among Reproduction, Pronunciation and Recognition-of-Meaning Tests of Conventional Characters in the Post-test

Test	Reproduction	Pronunciation	Recognition-of-Meaning
Reproduction	-	0.258 *	0.334**
Pronunciation	-	-	0.699**
Recognition-of-Meaning	-	-	-

Table 11

Intercorrelation Coefficients Among Reproduction, Pronunciation and Recognition-of-Meaning Tests of Conventional Characters in the Retest

Test	Reproduction	Pronunciation	Recognition-of-Meaning
Reproduction	-	0.606**	0.339**
Pronunciation	-	-	0.657**
Recognition-of-Meaning	-	-	-

* $p < .05$

** $p < .01$

Table 12

Intercorrelation Coefficients Among Reproduction, Pronunciation and Recognition-of-Meaning Tests of Simplified Characters in the Post-test

Test	Reproduction	Pronunciation	Recognition-of-Meaning
Reproduction	-	0.698**	0.466**
Pronunciation	-	-	0.719**
Recognition-of-Meaning	-	-	-

Table 13

Intercorrelation Coefficients Among Reproduction, Pronunciation and Recognition-of-Meaning Tests of Simplified Characters in the Retest

Test	Reproduction	Pronunciation	Recognition-of-Meaning
Reproduction	-	0.663**	0.512**
Pronunciation	-	-	0.895**
Recognition-of-Meaning	-	-	-

* $p < .05$

** $p < .01$

character-form from their memory.

As is customary, the test scores on pronunciation and recognition-of-meaning are found to be better than those on reproduction, signifying that reproduction is the most difficult aspect of learning and retaining the Chinese characters. This is true for both simplified and conventional characters.

Further discussion. The preceding discussions on the data obtained in the post-tests and the retests have thrown some light on the problem if simplified Chinese characters do facilitate the learning and retention abilities in reproduction, pronunciation and recognition-of-meaning in comparison with their conventional counterparts. Although the present study was not planned to draw clear-cut conclusions from its results, a further discussion on the principles of learning Chinese characters in connection with earlier findings might prove helpful to understand better the related questions in learning and retaining Chinese characters.

According to Ei Wai (1955), characters between one to ten strokes are easy to perceive, and those of over 15 strokes are comparatively difficult for perception. The present results in reproduction performance tend to support this statement. Of the 7 characters which attracted over 80% of correct answers in reproduction in the post-test, six of them are characters with less than ten strokes. The

remaining one is of 12 strokes. And of the nine characters which attracted less than 20% of correct answers in reproduction in the post-test, all of them are characters of over 13 strokes. Similar results occured in the retests. In the tests on pronunciation and recognition-of-meaning, however, this situation was not conclusive as no clear-cut patterns could be identified in regards to the relation between the character complexity and the response pattern.

As shown in this experiment, characters with the same number of strokes represented different difficulty levels. This was true for tests on reproduction, pronunciation as well as on the recognition-of-meaning. It was believed that characters were difficult to perceive if they were of over 13 strokes, consisting of left and right parts and with one part exceeding the other by over ten strokes (Ei, W. , 1955). Again, the results of this study tend to support this theory in the reproduction performance. Take the characters 擾 and 亂, for example; they attracted two and four right answers out of the 48 students. However, this situation did not apply to the tests on pronunciation and recognition-of-meaning.

Another aspect in learning Chinese characters as stressed by Ei Wai (1955) was that symmetrical parts such as 雙, 双 and 閉 were easy to perceive and to learn. This rule received full support from the test results on all the three aspects, that is, reproduction, pronunciation and recognition-of-meaning.

CHAPTER IV

SUMMARY AND RECOMMENDATIONS

Summary

The purpose of this study was to investigate the effects of instructional materials written in simplified and conventional Chinese characters on learning and retention levels in terms of reproduction, pronunciation and recognition-of-meaning. A sample of 100 students was drawn from primary one classes of Hong Kong Salesian Primary School. The experiment was based on a reverse group design using post-test and retest (one week's interval) procedures. The main characteristic of the design is the reverse of the treatment conditions between the two groups in two seperate trials. In trial one, class A learnt simplified characters and class B learned conventional characters. In the second trial, the treatments were reversed between the two classes. The instructional materials were different in the two trials. The dependent variable is therefore achievements in learning and in retaining the 50 target characters while the independent variables are the two versions of Chinese characters.

To promote better learning motivation, the 50 target characters were built into a story adapted from the popular Chinese novel Adventures to the West. The experimental data obtained were analysed by calculating the t values to test

the significance of group difference in scores and the retention rates of reproduction, pronunciation and recognition-of-meaning. The correlation coefficients of these three language aspects were also calculated.

Based on the reproduction tests, the findings of this study supported the assumption that the simplified forms of Chinese characters enhance acquisition and retention levels, though not the retention rates which is over 80%. But within the framework that the reduction of strokes helped reproduction, there appeared to be a number of other factors affecting the reproduction ability, most prominent among them the part-whole relation of the character.

Test scores on pronunciation between the SC and CC groups did not reach significant difference both in the post-test and the retest. It appears that the influence of character-forms upon the pronunciation of Chinese characters, if any, was over-shadowed by the impact of other elements as yet to be discovered. The retention rate of oen-week's interval was well close to that of reproduction.

The difference in mean scores in the recognition-of-meaning was not significant between the two treatment groups despite the simplification which reduced the number of strokes to over 50%. Similar to the pronunciation performance, it appears that the acquisition of character-meaning depends on many elements other than the complexity of the character-form.

It is found that there existed various difficulty

levels among the three language aspects in learning and retaining Chinese characters, with character-meaning the easiest to acquire, then the pronunciation and the reproduction. The correlation of these three aspects was high, particularly in the case between pronunciation and recognition-of-meaning.

Recommendations

1. As the subjects of the present study are Chinese children of ages 6-7, the instructional materials cannot be comprised of characters exceeding primary two standard. This limitation may be eliminated, however, if the subjects be substituted by older children who have not been exposed to the Chinese language. In so doing, the variable of previous knowledge can be completely controlled. It is therefore recommended that replication of this experiment is best to be carried out by selecting subjects from non-Chinese students.

2. Owing to administration difficulties in the Salesian School, the duration of the experiment was restricted to one week. Replication of this study for a longer period of time is recommended. More characters can then be included in the experiment and the retention rate can be tested for more than one-week's interval. The reliability of the experiment could consequently be increased.

3. According to the results of this experiment, simplification of characters does indeed help the reproduction

of Chinese characters; but simplification alone does not help the pronunciation and recognition-of-meaning of Chinese characters. The process of the simplification of Chinese characters and the 'Chinese script reform' is still going on in and outside Mainland China. Further studies to investigate the best way to simplify Chinese characters and to reform the Chinese script in terms of gaining better teaching and learning results are recommended.

4. The findings of this experiment suggest that the complexity of Chinese character-forms is only one of the many factors that affect the difficulty level of learning and retaining Chinese characters. As the present experiment was not designed through classifying the target characters for analytical purposes, it would be of value to conduct experiments concentrating on the examination of other possible elements that might affect the learning and retention of Chinese characters.

5. This experiment has been the first of its kind to investigate experimentally the effects on the teaching and learning processes by using simplified Chinese characters in lieu of conventional characters in normal Chinese lessons. The implications derived from this experiment, although far from being conclusive, have suggested certain directions to which future investigations may head. It is hoped that more efforts will be put on this controversial but vital problem for the benefits of the millions of Chinese people and their generations to come.

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西遊記（上）

孫悟空和猪八戒保卫着師父，向西赶路。忽然天空充滿妖雾，師父緊閉着双目。

悟空說：「有我在，妖怪有來无還。」

八戒於是让師父坐下。悟空举起金刚棒，在地上刻個圈圈，把他們围着。

悟空离去後，會变化的妖怪出來巡逻。見到八戒師徒，独不見悟空。正要扑下去攻击，圈圈边上忽然射出金光，象伞一樣保卫着師父，扰乱了妖怪的計划，使他沒有办法达到目的。

APPENDIX 2

Instructional Materials for Conventional Chinese Characters - Trial 1

西遊記（上）

妖父

來無影迹。悟空說：「師父，路有妖怪，快快讓開，我來收伏牠。」說罷，拿起金箍棒，朝着妖怪的頭上打去。妖怪應手而倒，現出原形，是一隻九尾白狐狸。

悟空收了金箍棒，再看那狐狸，已經死了。

悟空回到師父面前，

APPENDIX 3

Instructional Materials for Simplified Chinese Characters - Trial 2

西遊記（下）

女妖考了女佳
說：「可以給八戒的捉身子有於是
便應，那女兒可現有了一落，落化一棵果
悟空法拉着正要悟空回一會，是一王個妖，
師，下使回捉着師正要悟空回一會，是一王個妖，
來了師父可等悟空回一會，是一王個妖，
見他父要走，回來，拔一廟小。
了們追走，出圈八來。功
，。出圈八來。功
万分。圈八戒上
分外。不。八
恼心，然；

西遊記（下）

於是妖怪一擺腦袋，嚇人
難看的身子便化成一個嬌艷的
女子，提着籃菜上天王廟。見
了八戒的儀容，大吃一驚。
八戒說：「大爺不是壞人，
可以給你帶路。」
師父觀看了一會，勸八戒
說：「我寧可等悟空回來。」
那女子正要走，八戒不加
考慮，拉着師父追出圈外，女
妖便顯法捉了他們。
悟空回來見了，萬分傷心，
便化作一隻
蒼蠅，四下
嚴密尋找，
希望奪回師
父。

APPENDIX 5

Distribution of Target Simplified Characters Among the 10 Representative Simplification Rules

1. By changing to a simpler phonetic-compound (改换较简单的声旁) -趕(赶),廟(庙),嚇(吓),擾(扰).
2. By creating a new phonetic-compound (另造形声字) -讓(让),驚(惊),寧(宁),撲(扑),達(达).
3. By substitution of homophones (同音代替) -像(象),劃(划).
4. By substituting complex parts with simpler parts (以简单的偏旁代替笔劃多的偏旁) -難(难),艷(艳),儀(仪),壞(坏),觀(观),勸(劝),邊(边),亂(乱).
5. By preserving characteristic part or parts of a character and omitting the rest (保留該字的特徵部份而省略其他) -衛(卫),霧(雾),離(离),獨(独),擊(击),辦(办),爺(爷),顯(显),嚴(严).
6. Originating from the Running Script (草書楷化) -圍(围).
7. By forming characters that imply the meaning (會意字) -雙(双),擺(摆).
8. By forming characters with similar contour (輪廓字) -傘(伞),齋(斋),蒼蠅(苍蝇).
9. By reducing the number of strokes of certain part or parts of a character (以簡單的筆劃代替筆劃多的部份) -緊(紧),舉(举),變(变),邊(边),腦(脑),閉(闭),剛(刚),帶(带),嬌(娇),傷(伤).
10. By preserving the upper and lower parts of the character and omitting the middle part (保留字的上部和下部而省略其中部) -處(处),尋(寻),奪(夺).

APPENDIX 6

Scores on Reproduction Post-test

Trial 1				Trial 2			
衛趕霧緊閉雙無讓舉剛圍離變邏獨撲擊邊像傘撥亂劃辦達	32	卫赶雾紧闭双无让举刚围离变逻独扑击边象伞扰乱划办达	44	擺腦嚇莫嬌艷齋廟儀驚爺環帶觀勸寧慮顎萬傷蒼蠅嚴尋奪	31	摆脑吓难娇艳斋庙仪惊爷坯带观劝宁虑显万伤苍蝇严寻夺	29
	39		45		21		29
	28		42		26		33
	10		28		20		29
	37		30		21		21
	42		46		16		25
	40		42		21		22
	18		33		25		31
	13		35		28		29
	27		42		23		30
	19		31		19		25
	14		27		8		22
	6		15		26		27
	29		26		31		18
	25		21		25		23
	18		22		11		26
	17		24		10		24
	27		21		7		19
	39		45		32		37
	41		32		19		24
	2		11		19		20
	4		20		19		17
	30		10		2		19
	15		25		4		17
	18		34		7		21

APPENDIX 7

Scores on Reproduction Retest

Trial 1		Trial 2	
衛 27	卫 40	摆 25	摆 29
趕 37	赶 40	脑 18	脑 23
霧 26	雾 40	吓 22	吓 33
緊 10	紧 28	难 15	难 23
閉 35	闭 29	娇 20	娇 19
雙 37	双 43	艳 12	艳 23
無 37	无 42	斋 21	斋 20
讓 18	让 32	庙 17	庙 28
舉 12	举 33	仪 16	仪 19
剛 26	刚 39	惊 20	惊 28
圍 17	围 26	爷 19	爷 26
離 13	离 24	坯 8	坯 18
變 2	变 14	带 13	带 27
邏 23	逻 21	观 31	观 16
獨 25	独 20	劝 23	劝 13
撲 13	扑 20	宁 8	宁 17
擊 12	击 21	虑 7	虑 19
邊 21	边 18	显 6	显 11
像 37	象 37	万 29	万 26
傘 40	伞 30	伤 12	伤 14
擾 2	扰 9	苍 15	苍 18
亂 4	乱 19	蝇 15	蝇 12
劃 23	划 6	严 3	严 9
辦 14	办 16	寻 5	寻 10
達 17	达 27	夺 7	夺 15

APPENDIX 8

Scores on Pronunciation Post-test

Trial 1				Trial 2			
衛	39	卫	45	擺	40	摆	43
趕	45	赶	43	腦	42	脑	44
霧	40	雾	47	赫	36	吓	40
緊	43	紧	37	難	32	难	30
閉	42	闭	41	嬌	34	娇	41
雙	43	双	48	艷	34	艳	42
無	44	无	46	齋	38	斋	32
讓	39	让	36	廟	32	庙	40
舉	45	举	38	儀	33	仪	19
剛	46	刚	38	驚	30	惊	35
圍	43	围	31	爺	37	爷	40
離	32	离	30	壞	33	坏	32
變	41	变	35	帶	41	带	45
邏	39	逻	32	觀	45	观	20
獨	40	独	40	勸	23	劝	25
撲	38	扑	34	寧	34	宁	27
擊	40	击	30	處	23	处	27
邊	45	边	41	顯	19	显	20
像	43	象	45	萬	40	万	33
傘	47	伞	46	傷	42	伤	35
擾	30	扰	30	蒼	43	苍	42
亂	42	乱	33	蠅	47	蝇	45
劃	38	划	39	嚴	21	严	15
辦	41	办	45	尋	17	寻	25
達	37	达	43	奪	17	夺	20

APPENDIX 9

Scores on Pronunciation Retest

Trial 1				Trial 2			
衛	40	卫	37	摆	32	摆	33
趕	39	赶	37	腦	40	脑	37
霧	43	雾	37	嘯	33	吓	32
緊	29	紧	34	莫	27	难	25
閉	41	闭	43	女	35	娇	36
雙	44	双	43	艷	37	艳	37
無	43	无	38	齋	35	斋	33
讓	30	让	28	廟	33	庙	35
舉	33	举	37	儀	26	仪	16
剛	36	刚	41	驚	25	惊	28
圍	24	围	31	爺	36	爷	37
離	16	离	28	壞	31	坯	26
變	25	变	21	帶	37	带	39
邏	31	逻	25	觀	38	观	21
獨	33	独	32	勸	15	劝	21
撲	22	扑	27	寧	22	宁	22
擊	21	击	29	慮	16	虑	24
邊	40	边	19	顯	10	显	11
像	45	象	47	萬	41	万	29
傘	42	伞	46	傷	40	伤	27
撥	28	拨	22	蒼	36	苍	42
亂	30	乱	32	蠅	38	蝇	43
劃	21	划	22	嚴	16	严	17
辦	32	办	36	尋	17	寻	23
達	40	达	24	奪	12	夺	15

APPENDIX 10

Scores on Recognition-of-Meaning Post-test

Trial 1		Trial 2	
41	44	34	37
43	42	43	44
42	46	46	41
43	41	45	34
42	40	40	47
42	46	40	47
45	40	43	34
43	42	41	44
41	42	37	34
40	42	34	33
45	38	46	36
39	44	44	36
40	38	36	39
41	39	31	29
46	38	24	33
46	42	37	28
37	43	32	25
46	39	26	24
46	41	46	37
47	43	36	34
40	39	47	47
43	42	47	47
47	39	31	20
47	43	32	38
44	43	21	23

APPENDIX 11

Scores on Recognition-of-Meaning Retest

Trial 1		Trial 2	
衛 44	卫 42	摆 34	摆 34
趕 41	赶 37	腦 40	脑 39
霧 43	雾 35	嚇 40	吓 39
緊 36	紧 33	難 39	难 34
閉 41	闭 38	嬌 35	娇 40
雙 40	双 46	艷 36	艳 40
無 40	无 34	廟 39	庙 33
讓 43	让 34	儀 38	仪 37
舉 45	举 42	驚 32	惊 28
剛 39	刚 41	爺 30	爷 28
圍 39	围 39	墜 39	坠 37
離 38	离 36	帶 42	带 35
變 41	变 39	觀 38	观 37
邏 38	逻 31	勸 29	劝 28
獨 40	独 38	寧 19	宁 29
撲 42	扑 37	慮 28	虑 23
擊 42	击 38	顯 25	显 27
邊 43	边 33	萬 16	万 24
像 43	象 38	傷 38	伤 24
座 44	坐 41	蒼 37	苍 35
擾 36	扰 32	蠅 44	蝇 42
亂 37	乱 41	嚴 44	严 42
劃 41	划 37	尋 33	寻 19
辦 42	办 44	奪 27	夺 31
達 37	达 40		21

APPENDIX 12

Frequency Distribution of the 50 Simplified and Conventional Characters in Terms of Number of Strokes

	Simplified	Conventional
3 Strokes	1	0
4 Strokes	4	0
5 Strokes	6	0
6 Strokes	9	0
7 Strokes	7	0
8 Strokes	4	0
9 Strokes	6	0
10 Strokes	7	1
11 Strokes	1	2
12 Strokes	2	5
13 Strokes	2	5
14 Strokes	1	6
15 Strokes	0	7
16 Strokes	0	2
17 Strokes	0	4
18 Strokes	0	5
19 Strokes	0	4
20 Strokes	0	2
21 Strokes	0	0
22 Strokes	0	0
23 Strokes	0	4
24 Strokes	0	2
25 Strokes	0	1
Total No.of Strokes	378 (46.2%)	817 (100%)

APPENDIX 13

Reduction of Strokes of the 50 Conventional and Simplified Characters.

No. of Strokes CC	No. of Strokes SC	Reduction	No. of Strokes CC	No. of Strokes SC	Reduction
18	13	5	15	3	12
13	10	3	14	10	4
17	6	11	18	13	5
19	10	9	15	10	5
15	9	6	11	6	5
24	10	14	18	4	14
17	9	8	12	4	8
15	8	7	24	5	19
15	5	10	17	9	8
23	11	12	10	6	4
12	6	6	12	7	5
19	8	11	18	10	8
11	9	2	23	8	15
25	6	19	23	12	11
20	4	16	16	9	7
14	5	9	15	5	10
15	10	5	17	5	12
23	9	14	19	5	14
13	3	10	14	12	2
13	6	7	12	6	6
14	7	7	18	7	11
19	14	5	13	7	6
20	7	13	14	6	8
12	7	5	16	4	12
14	6	8	13	7	6

	CC	SC	Reduction
Pooled Total	817	378	439
Pooled Mean	16.37	7.56	8.78
Pooled SD	3.82	2.69	4.08
Reduction %			53.8